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"Ambulatory PCNL" (tubeless PCNL under regional anesthesia) – A preliminary report of 10 cases

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Abstract. *Aim:* We report the technique, safety, outcome and efficacy of "tubeless percutaneous nephrolithotomy (PCNL) performed under regional anesthesia" in selected cases. *Methods:* Patients satisfying the entry criteria for the regional block (spinal low-dose anesthesia with low-dose Bupivacaine plus Fentanyl) and tubeless procedure were subjected to a tubeless spinal PCNL The patients were followed up the next day for an ultrasonography and an x-ray of the KUB region. *Results:* All the ten patients were discharged uneventfully the next day (mean hospital stay-40 h). No blood transfusion and postoperative analgesics (mean post op visual analogue pain score was 2.4) were required. The mean time to return of S_1 sensation, motor block and walking were 183,118 and 196.6 min respectively. There was complete stone clearance in all the cases with a mean collection of 14.5 cc was seen on the post op ultrasound. *Conclusions:* The present cases were reported to highlight that in a select group of patients tubeless PCNL under regional block is technically feasible and viable option. Regional block has the advantage of avoidance of general anesthesia and anaphylaxis due to use of multiple drugs. Tubeless PCNL has the advantage of avoidance of nephrostomy tube related postoperative pain discomfort and urosepsis. This synergistically (spinal + tubeless PCNL) speeds up the recovery, shortens the length of hospitalization and the analgesic requirement.

Key words: Percutaneous nephrolithotomy (PCNL), Percutaneous nephrostomy, Regional anesthesia, Tubeless PCNL

Introduction

Percutaneous nephrolithotomy (PCNL) has now been in vogue for over 20 years. Several changes and modifications have taken place in the last few years in an attempt to further refine the procedure and to lower the morbidity, analgesic requirements and duration of hospitalization. These include use of regional blocks, single step dilatations, "mini-perc" technique, tubeless PCNL and sandwich therapy [1–8]. There exists inadequate published literature [4–6], however, with regard to the use of regional anesthesia in patients undergoing PCNL and this forms the basis of our current study.

Patient and methods

The entry criteria for a regional block included (i) low grade or Grade 1 A.S.A patients with good safety margins, (ii) limited stone burden where a short procedure was contemplated and stones located in the middle or inferior calyx. The criteria for tubeless PCNL were (i) minimal stone burden up to 2 cm, (ii) pelvicalyceal morphology favoring single step dilatation and single tract direct stone access, (iii) procedure accompanied by minimal or no tract bleeding, (iv) no pelvicalyceal system perforation and (v) complete stone clearance obviating any relook.

Prone position PCNL was performed in all the cases under prophylactic antibiotics (Inj Amikacin 500 mg IV) and regional block (spinal anesthesia using 1.2 ml [6 mg] of 0.5% Bupivacaine-heavy and 25 μg of Fentanyl, diluted to a total volume of 3 ml of isotonic saline injected over a period of 2–3 min via the L2/3 interspinous space using a 25G pencil–point Whitacre^{TM} needle). At the completion of the procedure the Amplatz sheath

was removed leaving the guidewire in place and a direct tract nephroscopy was performed to look for any major tract bleeders. Major bleeders in the tract were controlled by diathermy using a diathermy wire introduced via the nephroscope. An indwelling temporary ureteral catheter was left at the end of the procedure that was removed after 6 h. A check ultrasound KUB was performed the next day prior to discharge to rule out any collection/urinoma.

Results

The patient ages were (35–60) mean-48.1 years. The stone burden was 100–250 mm^2 (mean-161 mm^2) and the mean operating time (ORT) was 48.4 min, an average of 4.5 l of normal saline irrigant was used and check fluoroscopy showed complete stone clearance in all the cases. The post op recovery was smooth except for complaints of mild pruritis at the tip of the nose and upper chest in 7 cases that resolved within 3 h. The mean time taken for (i) return of S_1 sensation to pin prick was 183 min; (ii) return of the motor block (Bromage scale) to 0 was 118 min and (iii) return to walking was 196.6 min. An ultrasound performed the next day showed a mean 14.5 cc (10–25 cc) collection. No postoperative analgesia was required (postoperative visual analogue scale score was 2–3 on a 0–10 cm scale). All the patients were discharged uneventfully at the end of the 1st postoperative day (mean hospital stay 40 h). Prophylactic oral Gatifloxacin (400 mg,OD) was continued for 5 days in all the cases.

Discussion

Tubeless PCNL [1, 2] or PCNL without a percutaneous nephrostomy tube (PNT) in situ is not a new procedure. While it is widely recognized that the major morbidity of the procedure stems from the placement of a residual PNT often placed at the termination of the procedure with the overall morbidity may be as high as 18% [3], never the less, the PNT has several advantages: (i) unimpeded drainage of any infected urine, (ii) allows a relook in case of any residual stones, (iii) tamponades any tract hemorrhage, and (iv) it also prevents the development of adjacent organ effusion/collection/urinoma. In addition a prolonged PCNL carries the attendant risks of sepsis and irrigant fluid imbibitions. Thus we suggest that if these problems can be prevented then one may safely omit the placement of a PCN (tubeless PCNL) in a carefully group of selected patients such as above to decrease the postoperative morbidity. Tubeless PCNL was considered in these cases because (i) there was no major tract hemorrhage at the end of the procedure, (ii) there was no pevicalyceal system perforation, (iii) there were no residual stones, (iv) a single direct access tract was used, (v) the procedure was short which reduced the hazard of sepsis and fluid imbibition, and lastly (v) we wanted to lower the post-op analgesia requirement and post op patient pain/discomfort.

Other options available to further diminish the morbidity of PCNL include, (i) using regional anesthesia, [4, 5, 6] and (ii) using the "mini-perc" [7] technique. Options available for regional anesthesia include 'interpleural block, [4] and spinal anaesthesia [5] or both may be combined [6]. Whilst spinal subarachnoid anesthesia [5] has been used in the past, interpleural block [4, 6] is a relatively newer addition. The use of spinal blocks has shown to statistically significantly reduce the postoperative pain and parenteral pain medication leading to an earlier ambulation [5]. The latter interpleural block technique though reported [4, 6] as promising has largely only an adjuvant effect to spinal analgesia and cannot be used in isolation [6]. We contemplated the use of regional block as (i) all our patients were ASA Grade 1 patients with an excellent safety margin, (ii) the stone burden was limited and a short procedure was contemplated (iii) we wanted to further cut down on the duration of hospitalization, and (iv) reduce the rising episodes of risks of anaphylaxis [8] related to use of multiple anesthetic drugs required for general anesthesia. Saied et al. [6] have used a very high dose (15 mg) of 0.5% heavy Bupivacaine for spinal anesthesia in PCNL patients [6], but this would have resulted in prolonged recovery times and hence would be unsuitable for an ambulatory PCNL. In an effort to reduce the duration of hospitalization, we used a combination of {low-dose (6 mg) Bupivacaine-heavy (0.5%) and 25 μg of Fentanyl (liophilic opioid)} thereby reducing the recovery time, thus making spinal anesthesia more suitable and acceptable for an ambulatory PCNL. Few published reports exist in the literature regarding the

use of spinal anesthesia for PCNL [4–6]. Andreoni & Clayman et al. [5] had also concluded that a single preoperative dose of subarachnoid spinal analgesia reduces the postoperative pain, parenteral pain medication, nausea and encourages earlier ambulation. Recent experience with intrathecal Sufentanil (another liophilic opioid) [9–12] alone for spinal anesthesia suggests it may offer excellent anesthesia and analgesia for SWL patients [9–12], however it remains to be seen whether this will suffice for PCNL too.

By substituting general anesthesia with regional (spinal subarachnoid block) anesthesia, a tubeless procedure and an external ureteral access catheter in these selected ten patients we were able to avoid any complications, post op analgesics, and discharge them on the 1st PO day (within 48 h). No post op analgesics were needed in all our cases (as the mean postoperative visual analogue pain score was 2.4).

Whilst we have not compared our data with those PCNL patients in whom the procedure was done under general anesthesia with a PNT, the post op recovery, pain, parenteral analgesic requirement and duration of hospitalization did certainly seem to be on the lower side. Selected patients for such a ''more ambulatory tubeless PCNL with regional block'' could be those with a minimal stone burden, single tract direct stone access with single step dilatation, minimal or no tract bleeding and complete stone clearance obviating a re-look.

Conclusions

By the omission of the percutaneous nephrostomy tube and adopting regional (spinal low-dose anesthesia low-dose Bupivacaine plus Fentanyl) in place of general anesthesia in selected patients, one may further reduce the morbidity without compromising effectiveness and safety. A greater number of cases would be definitely needed to better define these modifications before their use in selected patients can be recommended on a routine basis and further studies would be needed to objectively confirm these possibilities before these modifications can be fully incorporated in to PCNL as a more ''ambulatory PCNL''. Never the less in carefully counseled and meticulously selected cases we advocate the use of ''tubeless PCNL under regional anesthesia''.

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